Robinson inflation for repetitive planar tilings

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Abstract

A *planar tiling* is a partition of $\mathbb{R}^2$ into *tiles*, which are polygons touching face-to-face obtained by translation from a finite set of *prototiles*. Let $\mathbb{T}(\mathcal{P})$ be the set of tilings $\mathcal{T}$ constructed from a finite set of prototiles $\mathcal{P}$. It can be endowed with a natural topology which turns it into a compact metrizable space laminated by the orbits of the natural $\mathbb{R}^2$-action. If $\mathcal{T} \in \mathbb{T}(\mathcal{P})$ is a *repetitive* tiling (i.e. for any patch M, there exists a constant $R > 0$ such that any ball of radius R contains a translated copy of M), then the closure of its orbit $\mathbb{X} = \overline{L}_{\mathcal{T}}$ is a minimal closed subset of $\mathbb{T}(\mathcal{P})$, called the *continuous hull of* $\mathcal{T}$. If $\mathcal{T}$ is also *aperiodic* (i.e. $\mathcal{T}$ has no translation symmetries), then $\mathbb{X}$ is transversally modeled by a Cantor set.

The aim of this poster is to illustrate a special *inflation* process for these laminations, which will be called Robison inflation because it is inspired by the construction process of Robinson tilings. We use it to prove that the continuous hull of any repetitive and aperiodic planar tiling is *affable*, i.e the equivalence relation induced on any total transversal is orbit equivalent to an inductive limit of finite equivalence relations. This approach allows us to recover an important result by T. Giordano, H. Matui, I. Putnam and C. Skau regarding the affability of free minimal $\mathbb{Z}^2$-actions on the Cantor set, but without using convexity arguments.

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